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Infantile Pedagogy from the Physiological Standpoint.

A PAPER READ BEFORE THE

BUTLER COUNTY MEDICAL SOCIETY,

AT

HAMILTON, OHIO, OCTOBER 1, 1885,

By DR. DAN MILLIKIN.

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INFANTILE PEDAGOGY FROM THE PHYSIOLOGICAL STANDPOINT.

By DR. DAN MILLIKIN.

The little children in the two or three lowest grades of our public schools are little more than infants, and to me it seems only fair that we should lay down for them some special principles of pedagogy, such as a physiologist might approve. They differ very much from older children, and on that account they demand some special study. The little creatures have one mental peculiarity which strongly attracts my attention as I begin this discussion, and that is a result of the fact that they begin their intellectual life simply by perceiving, or simply by the passive reception of sensations, and only slowly and tardily do they come to have some power of active, independent thought. It is by such means that they learn their first lessons of experience, and this mode of learning continues to be dominant for years. I think, then, that, as a physiologist, seeking always the normal, which is the natural mode of activity, I do not speak extravagantly when I say that the perceptive powers should be chiefly used, and chiefly appealed to, in the early, infantile, and puerile years. If this is the natural method of learning in these tender years, the argument might rest at this point of my discourse; for, what better can we do than to keep close to nature in such a matter?

Have we any anatomical explanation of the difference between the intellection of young children and that of older persons? There is a very clear structural difference that has been pointed out by Jacobi and others: The cerebrum of the young child contains, relatively, a great deal of water, and the cerebellum contains relatively little. The cerebrum is comparatively soft, pulpy, and, as one may rightly argue, is inefficient. The cerebrum of infancy is not yet ready for the highest activity; the cerebellum is ready.

¹ Read before the Butler County Medical Society, at Hamilton, Ohio, October 1, 1885.

Aside from this difference of histological structure, there is a marked peculiarity in the coarse anatomy of the infantile and puerile brain that argues its functional inefficiency. The cerebrum of these small fry conforms closely to that of mammals inferior to man. It is like the cerebrum of an ape, and, in some regards, it is like the cerebrum of a dog, or of some mammal of that order of perfection. Owing to the great amount of water in the infantile cerebrum, its tissues are very soft. Its convolutions are not deep, nor are they tortuous in their pattern as in the adult brain. The important distinction between the white and gray matter is not well marked. The ventricles are smooth. We know that these characters which the baby's brain conspicuously lacks are the qualities which belong pre-eminently to the thinking animals, and belong in their most exaggerated degree to those animals that think the most. What, then, is the inference as to the baby's intellectual performances?

Or, not confining our studies to the brain alone, take another fact as to the infantile nervous system. Says Jacobi: "In the child the peripheric nerves are comparatively larger than the centres, — the sympathetic ganglia being the only exceptions to this rule. The spinal cord predominates over the brain, the centres of motion and circulation in the anterior horns over those of sensation, and therefore we find more vascular and reflex function, and less intellectual capacity. The former are the direct results of early and complete development; the latter requires time for growth."

Or, recapitulating this and the last statement, the lower, inferior, strictly animal parts of the nervous system preponderate in infancy; the nerves are disproportionately large as compared with the nerve-centres; the anterior horns of the spinal cord preponderate over the posterior; the cord itself is proportionately larger than the brain; and, in the brain, the cerebellum preponderates over the more intellectual cerebrum.

Now where does this anatomical study lead us? Does it not lead us to the educational system of Froebel, the kindergartner? Within the kindergarten we notice, first, that the teacher is pursuing a natural and physiological method. The children in that school are children. Mental fatigue is out of the question, and, for that reason alone, the system is commendable from the physiological standpoint.

And then the character of the work — see how well it conforms to what we know of the anatomy and physiology of the infantile nervous system! The perceptive powers are continually exercised, and possibly, in some cases and to some small extent, they are stimulated. The study is of forms, and of colors, and patterns, and trades of men,

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and the habits of animals. The school is dealing with *things*, not with the abstractions which to us older people are the real entities, but which are an affliction to the little ones. We have seen that the child's brain is unfit for any intellectual work of the highest sort. In accordance with this inexorable fact, the system of Froebel forbids anything like sustained ratiocination. I declare it to be, therefore, a natural and physiological method.

The infantile brain is not adapted, and cannot be adapted, to prolonged effort of any kind, and in the kindergarten this is a principle carefully regarded, for there the exercises are always short, and are frequently varied. The burdens laid upon the pulpy and undeveloped brain, overbalanced as it is by the other parts of the nervous system, are very light.

The kindergarten finds a physiological justification in this also. The work is incessantly broken and varied not only by the greatest variety of pursuits, so that the baby mind in its natural fickleness may not be exhausted, but also by physical exercises, marches, songs, pantomimes, and the like. So, while the system yields philosophically to the childish disposition to incessant motion, it yet guides and controls that motion to the extent of making it harmonious. In this is involved the idea of law and order and rhythm, and you who have looked into the matter carefully and patiently will agree that, while we cannot suppress the motion of children with safety, we can do the next best thing, — we can fix their attention on their bodily movements, and safely begin, at the most tender years, to bring their little muscles under the control of their little wills, *inducing* that harmonious action which we might command, but would command in vain.

And now permit a little digression from the taught to the teachers. While I am fully convinced that the first grade of our common schools should be a kindergarten, I am equally convinced that the kindergarten should be the earliest school for teachers. If I were the autocrat of the universe (and every one is pleased to imagine himself such), I would ask each candidate for a teacher's position: "Where, and when, and with what success did you teach a kindergarten?" The candidate not making a satisfactory answer to this question should be dismissed with a very emphatic recommendation to come no more until evidence could be brought that the principles of Froebel had been mastered. If so disposed, the despot might give reasons for his conduct. He might answer and say that the kindergarten is of value to discourage and eliminate those who, by some unfortunate defect of constitution, were unfit to teach. The teacher

possessed of the idea that the teacher's first duty is to "preserve order," as it is called in the cant of the schools, would be quickly disposed of by a course in the kindergarten where the orderly disorder prevails. The teacher who thinks, and by some vice of constitution is obliged to think, that his chief function is to pump knowledge into children, would soon be discouraged in the kindergarten; for this cramming process is not to be thought of in the kindergarten. Those who are endowed with the shrewish gift of scolding would soon drop out of sight,—for, in the kindergarten, as at home, this is the abomination of desolation. Among male candidates for teachers' positions, the weeding would be most notable in the case of those who have the cruel Napoleonic lust for power; for to them the kindergarten would seem to be the very crowning bloom of nonsense. Within its walls the principle of self-government is in full activity, and the teacher is little more than the president of the republic.

Besides being a sieve, to eliminate incompetent teachers and those who have not the special gifts to adapt them to the office of teacher, the kindergarten has the merit of being the best possible school for teachers. It is in the kindergarten that teachers may learn what they so hardly learn elsewhere, that children are not, as they are so often called, so much plastic material to be stamped and pressed into immutable molds; but that they are living things, with immutable laws of development, to which the molds must be adapted by the wise, adroit, and alert teacher. A course in the kindergarten, if anything, I should hope, would strip the teachers of the foolish notion that children may be *made* into good or bad scholars, and would develop the idea that they may be made to *grow* in good or bad directions. It is in the kindergarten, I should hope, that teachers might be converted from the prevalent idea that they are manufacturers; that the school is a factory; that the pupils are the raw material; that the graduates are the finished product. The methods of the kindergarten are not the methods of the artisan,—they are the methods of the horticulturist.

But, aside from all these questions, which are not strictly physiological, there is one peculiarity of the kindergarten for which I would plead with ten times my poor ability. I mean that it prescribes short hours for short children.

For us to open the argument, is a concession. The man who proposes to keep little children in the school-room for many hours in each day is the man who should assume the *onus probandi*. To place a small child in a crowded school-room is a procedure so artificial, so deleterious, upon the very first aspect of the case, that there can

hardly be any debate, *pro* and *contra*, until some reason for such a course is brought forward. But let us waive all this, and attempt to prove a negative.

We have already noted the difference between the infantile or puerile brain and the adult brain, and from this have inferred that the little child is not fit to perform the sort or the amount of work that is easily possible for an older child approaching maturity. Now turn from their brains to their bodies, and find them so different from ours that another argument is presented for shortening their hours of labor in school. Little children have, in fact, something to do besides doing a full stint of work in school. Their vital powers need to be exerted in other directions. They must accomplish so much in the way of growth and in the building up of new cells that we, who have merely to maintain the nutrition of cells already built up, should blush to set them tasks that would be great enough for mature, hardened brains and bodies.

Reflect a moment on the enormous rapidity of their growth in the early years of life. Schadow says that a child destined to attain the height of sixty-six inches will come into the world eighteen inches in length. In the first year the little fellow, if healthy, will grow about ten inches. In the second year it will grow four inches, and nearly, or quite, as much in the third year. In the fourth year it will grow three inches, or a little more. In the fifth year it will grow three inches, or a little less. In the sixth year it will grow two inches. In the next four years, carrying the child to the age of ten years, it will grow about an inch per annum. During these last four years, when the longitude of the child is increasing somewhat more slowly, the latitude is increasing very rapidly, so that the child ceases to be slender, and, oftentimes, seems to take on something of the outlines that belong to maturity. During these same four years, when the extremely rapid growth in length has somewhat diminished, the eruption of the six-year molars is completed, and is followed by the eruption of a number of the permanent teeth; and, in these same years, the child passes from a state of absolute dependence to one of comparative independence; and this means, as you will admit, a trying revolution in the whole moral and mental nature. These last four years before ten are years of enormously rapid growth, and of the evolution of new faculties and powers. Is it proper that the child should be, in any sense or to any degree, forced in its studies at such times?

But let us come to figures. The question continually presents itself, *How much can the average child study?* Before we answer it let us ask another: *How much can the average young man study?*

“At West Point Military Academy,” says Dr. Loring, “everything is in favor of the utmost efficiency. The pupils are picked young men, just past boyhood. They are excluded from dissipation and from general society; and their active bodily exercises, their regular diet and sleep, and the healthful climate of the place, leave nothing to be desired. The daily time assigned to study and recitations is about ten hours a day during the six cold months.” “At the Massachusetts Agricultural College the actual work amounts to nearly ten hours, daily, besides six and one-fourth hours of military drill and farm-work, weekly.”

I consider this to indicate the proper amount of study and recitation for mature, hearty, ambitious young men, who, at college, at least, are anxious to crowd a few years with the greatest possible amount of work; and who, oftentimes, have good reasons, financial or otherwise, to strain their powers a little. In making comparisons we should not forget that study at college is usually accomplished under circumstances that permit far more freedom of motion, and far more freedom of choice among studies, than there ever can be granted to the child in the school-room.

For young people fit for the high school, between the years of twelve and eighteen years, ten hours a day of study is not to be thought of. If all the hours of study and of recitation, at school and at home, foot up seven or eight hours, it is enough. The child that cannot make progress in these hours cannot make progress at all. More than those seven or eight hours will simply overtax the immature brains of the lads and lasses, and will inevitably lead to dullness in routine work, and absolute dullness and failure when it comes to original, creative work.

Below the age when puberty is impending and when a certain degree of maturity has arrived, what shall be said of the hours of study? The hours of school should be continually diminished in proportion to the immaturity of the little ones. If the first year of school were a year of kindergarten (and from the bottom of my heart I wish it were), children of six years, or even of five years, might safely be kept at their play-work for three hours daily. If the first year of school is to be our ordinary school-year, the children ought not, by any means, to go to school for more than three hours, and it should be forbidden to send children to school under the age of six and a half years.

The other young innocents, a little older than the youngest,—that is to say, between the ages of eight and ten years,—ought not, by any means, to be confined to the school-room more than three and a half or four hours.

What would be the results? A short time ago my own little boy was an attendant at a kindergarten, in his sixth year, and it was my intention to take him out of the kindergarten after the expiration of one year, and place him in the lowest class in the public schools. But, upon the promise of his kindergarten teacher to procure an assistant, and put him through the same course of instruction that prevailed in the public schools, I consented to leave the little fellow in the kindergarten through the second year. When the third year arrived, I sent him to take his place in the second year's grade in the public schools, with many misgivings whether he could keep his place, and with regrets that he had not found his place by entering the lowest grade the year before, according to my first plan. He had five little companions, similarly educated in the kindergarten, and transplanted at the same time into the public schools. Within a few days, the fact leaked out that all these six children were remarkably proficient in the studies of their new class, and, indeed, it was seriously proposed to promote some of them at once to the third year's grade in the schools. It should be recorded that they were not preternaturally bright children, and that their teacher was at that time only a novice, though she has since shown that she had the essential gifts of a teacher by her work in the public schools.

By what amount of study was this result brought about? This little group of six children only attended the kindergarten for the three hours of the ordinary morning session. Part of that three hours was taken up with the safe stowing of a lunch, and with a run out of doors in favorable weather. The singing, marching, and strict kindergarten work occupied so much of the remainder of the morning that these little pupils of the advanced class only attended to their reading, writing, spelling, and arithmetic for forty minutes each day. They were at that time competing, as you will remember, with children in the public schools, who (poor little souls!) were compelled to attend school more than four hours each day. These latter sufferers addressed themselves strictly to academic work from the start, without any kindergarten nonsense; and yet, in the year's race, the children who worked four hours a day, under the tuition of an experienced teacher, were fairly beaten by the children who worked forty minutes a day under the tuition of an inexperienced teacher!

In England the attempt has been made to educate the children of the working classes on what is known as the "half-time" system. Upon this admirable plan, children who are by stringent laws forbidden to work in the factories are permitted to work half the day, on condition that they go to school the other half. Under these circum-

stances it has been found that the progress of the half-time scholars is quite as rapid as that of children who attend longer daily sessions of schools. Duly considering the coarse material that is furnished these schools, and duly measuring the results, it is fair to say that nothing better than the half-time system could be devised for all the children in England.

The argument is strengthened by the great success of night schools,—a success that is out of all proportion to the time employed.

The question of how much time children should spend in school is much simplified for me by a firm conviction that children of well-to-do parents should not study in school at all. They should ordinarily study at home, and there, with their other lessons, should learn the most precious lesson of all,—the lesson of self-control. They should come to school with the *results* of study. They should come to recite, to read aloud, to write, to hear lectures and see demonstrations. I know right well that there are children with crowded, noisy, or disorderly homes for whom this plan will not answer. These children positively need the quiet of the school-room for the preparation of lessons. There are other scholars who possibly cannot study without the support and control of the teacher. But it is eminently desirable that recitations should be so arranged that those who choose to do so may go away early in the day, leaving the more breathing space, and the greater quiet, for those who may need to remain at school for study.

And in that phrase, "breathing space," is found a good reason for short hours at school. The air of school-rooms is bad, and always must be. It is particularly bad in school-rooms where little children are congregated. The best that money and skill can do is to make it not too bad. It is not in the books, but it is true, that little children need as much air as adults. In the first place, they are not so cleanly as adults. Witness the odor of a room where little children are assembled. Upon inquiry, I find that little children are not bathed even once a week, in cool weather, as a rule. In many families where there is a scrupulous cleanliness as to the house and raiment, the little children are not bathed through the entire winter, save when they are visibly dirty. In many families, where we would expect better practices, there is so much boasting of the weekly bath for little children that I know the bath is regarded as a very heroic performance, not free from a very delightful spice of danger. Then, in the second place, children need as much free air as do adults, because they have such swift vital processes going on within their little

bodies, and such a great amount of excretory matter loading the expired air. In the third place, they need as much fresh air as adults, because they have, notoriously, very poor powers of resistance to foul air.

I, therefore, set it down as a fact that children, however small, need one thousand cubic feet of air-space, within which space the air should be wholly changed thrice in an hour. This allowance of space and air they will not get in school. To the end of time, they will be closely packed, because they are small. For this reason the air-space will be always less than a thousand feet per pupil. Even if, under exceptional circumstances, the little children have a sufficient amount of space, the changing of the air will permit the escape of costly hot air, and, at the same time, the influx of a quantity of disagreeable cold air; and so, from motives of economy and comfort, the children will not have the one-fourth part of three thousand cubic feet of fresh air per hour. Aside from all considerations of cerebral, or bodily, or intellectual development, here is a good reason for getting children out of the school-room as quickly as possible, and for keeping them out.

The sins against physiological laws that I have pointed out, — foul air, long hours, adult work for infantile brains, — all of this must induce weariness and disgust in the little fellows. Upon this grows indifference, absenteeism, truancy, and, last and worst of all, invalidism. When a child, weary of school, has been long kept out of school, on account of vague, incurable, and nameless maladies, which it shrewdly pretends to have; and more especially when it becomes prematurely an honest hypochondriac, no more pitiful wreck can be conceived, nor is there any patient more trying to the poor doctors, nor is there any spectacle more disgraceful to the accumulated wisdom of this educating, educated, nineteenth century.



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